[001] METHOD AND INSTALLATION FOR MAKING A TUBULAR PACKAGE

[002]

[003]

[004] The present invention relates to a manufacturing method for a tubular package or can. This can comprises an interior sleeve made of a tight, fragile and flexible material and an external body made of cardboard closed at both ends by two closures. The external body is provided between the two closures with a precut weakness located transversally to the tube axis to facilitate opening of the can. The invention also refers to a machine for the production of the package or can.

[005]

[006] Common composite tubular cans frequently include a body formed from a rigid material consisting of one or more layers of cardboard, an external printed label and an interior laminate. The latter is intended to ensure by its composition, both the tightness of the can and the compatibility of this laminate with the product to be packed. Very often, this laminate is provided with a layer of paper, a layer of aluminium and a protective coating to provide a neutral barrier between the aluminium and the product. This can often has a metal bottom that is crimped onto the body after filling. The lid is often made of an aluminium membrane ensuring the tamper- evidence of the sealed can and a plug or cap type plastic lid. This lid makes it possible on one hand to ensure protection of the membrane before the use and, on the other hand, the closure or sealing of the can after removal of this membrane.

[007] This type of can uses several materials for the manufacture of the principal body, the bottom, the lid and the protective membrane. Such kind of can is of a relatively high cost and causes problems at the ecological level, in particular for waste disposal and recycling. Indeed, to manufacture this can, a device is used for forming the body. Commonly, an aluminium membrane is applied provided with, or not, an easy system of opening. A moulded plastic lid, of a significant weight to obtain sufficient rigidity, is then placed on this membrane. Closure after filling is usually in the form of a metal bottom (steel,

tinplate or aluminium) of crimped type that is also produced on heavy and complex machines. Thus, a solid but expensive can is obtained. This type of can makes it relatively impossible to recycle because it is composed of various materials. Moreover, the system provided for opening is always formed on the top of the can, which makes presentation of the product impossible if the product is for example salted sticks or long biscuits.

[008]

[009] The purpose of the present invention is to eliminate the above-mentioned disadvantages. It is proposed a manufacturing method of an economic and ecological can easy to recycle and able to pack a very great number of foodstuffs, other goods, and particularly products that are preferably presented and so are extending out of the can when the lid is removed.

[010] The method according to the invention is characterized by the following steps.

[011] The interior sleeve is formed from a material coming out from a reel by passing it through a forming device around a mandrel and sealing the two longitudinal ends to form the tubular sleeve.

[012] A piece of cardboard which width corresponds to the periphery of the can and which length to the height of a single can or a multiple integer can height, is adhered onto the sleeve.

[013] The tubes obtained are then cut to form individual packs.

[014] One end of the can is then sealed in a tight and hermetic way.

[015] The can is filled with the required product to be packed and the other end is also sealed in a tight and hermetic way.

[016] The advantages of the can according to this method are as follows.

[017] The fact that the sleeve is glued inside the external body allows when the can is pressed at the precut weakness and therefore slightly crushed, to break the sleeve and at the same time break the precut weakness as well.

[018] Then, by applying traction to the two parts of the body, a separation of the can into two parts is thus obtained, allowing the product to be presented and displayed. This packed product is usually a long oblong product which length exceeds the length of the lower part of the can body. The nature of the tight and fragile sleeve accomplishes this method of opening whilst ensuring on one hand a perfectly sealed can and on the other hand proof that the can has not been tampered with before it is opened for the first time.

[019] According to an alternative method, a flange formed from a flexible material is sealed or glued inside the tube around the height of the precut weakness.

[020] The advantage of this flange is that it easily enables repeated closure of the can after its opening. A relative tightness is also ensured in this way since the higher part of the can is formed tightly around the flange extension.

[021] According to another embodiment of the invention, the production or forming of the tube, in particular the formation of the tubular sleeve and the incorporation of the external cardboard and the cutting into individual cans are carried out in a continuous and synchronized operation. This ensures a good rate of production.

[022] Of course, it is possible to carry out these operations step by step.

[023] The invention also relates to an installation that comprises a forming mandrel. The cross section of this forming mandrel corresponds to the shape of the tube to be formed. The installation also comprises a forming device positioned around the mandrel to form the sleeve coming out from a reel of material. The installation also comprises a:

[024] means for advancement of the sleeve,

[025] means for sealing the two longitudinal ends of the sleeve,

[026] feeding device for the sheets required to form the external can body,

[027] means for applying an adhesive to the inner face of the aforementioned sheets,

[028] means for allowing to apply the aforementioned sheet against the sleeve,

[029] means for the advancement of the formed tube,

[030] means for cutting the formed tube in individual cans,

[031] means for closing one end of the can and for closing the second end after filling.

[032] This production method and installation allows the formation of the principal part of the can. It achieves this in a particular way by the formation of the external body by gluing it directly on the sleeve by means of a method allowing to rotate around the mandrel and to apply the sheet directly onto the sleeve.

[033] According to an alternative embodiment, the means of application of the aforementioned sheet against the sleeve includes a first hollow cylinder provided with two longitudinal rows of radial holes connected with two individual vacuum chambers. The peripheral distance between the two longitudinal rows of radial holes corresponds at least approximately to the width of the sheets. The hollow cylinder is assembled or mounted on a device allowing, on one hand, to apply it against the mandrel and, on the other hand, to make it roll on and rotate around the aforementioned mandrel with the sleeve.

[034] The advantage of this hollow cylinder is that it allows to take and hold one end of the sheet. This sheet will close the holes of the first row of longitudinal holes when the vacuum is activated in one of the chambers. The vacuum takes hold of the cardboard sheet against the vacuum cylinder as this rotates around its axis. When the trailing end of the sheet arrives on the cylinder, the sheet end aligns with the second row of longitudinal holes, the vacuum is activated in the second chamber. This allows to have the cardboard wrapped against the cylinder with the face coated with adhesive facing outwards. Then by applying the cylinder against the mandrel with the sleeve, the cardboard is rolled onto the sleeve and is glued directly onto the

sleeve. This results owing to the fact that the hollow cylinder rolls around the mandrel and thus around the sleeve.

[035] According to an alternative method of execution, the allowing means to apply the hollow cylinder to the mandrel and to make it roll comprises two concentric rotating tables that move around the mandrel. The aforementioned hollow cylinder is supported by a system of bearings that copies the shape of the body of the tube.

[036] These means make it possible to allow the hollow cylinder turn around the mandrel by 360°.

[037] According to an embodiment, the aforementioned device to copy is made up for each plate of two cylinders allowing on one hand to approach or move away the aforementioned cylinder from the mandrel and on the other hand to hold and press it against the side surface of the mandrel to enable the sheet to roll onto the mandrel.

[038] According to a preferred embodiment of execution, the whole production method is synchronized to allow working in a continuous way. The sheet feeding device for applying adhesive and the device for applying the sheet against the mandrel and the means for cutting out into individual tubes are assembled or mounted on carriages. These carriages are provided with a means allowing them to be moved between predetermined positions forwards and backwards.

[039] According to another embodiment, the forming device and the device allowing the application of the hollow cylinder against the mandrel are laid out in the following way. They are laid out so that the joint lines obtained along the sleeve and those of the external body are opposed by approximately 180°.

[040] Lastly, according to a preferred embodiment, the installation comprises a device to work and seal or adhere a flange inside the tube.

[041]

[042] The invention will be described in more detail using the appended drawings.

[043] Figure 1 is a diagrammatic representation of a machine to produce and form the tube.

[044] Figure 2 represents an alternative for the shape of the mandrel.

[045] Figures 3, 4 and 5 are profile views showing the device allowing rolling the sheet of cardboard around the sleeve.

[046] Figure 6 is a cross-section of the finished can.

[047] Figure 7 shows the use of this can and in particular the method of opening.

[048]

[049] Using figure 1, the principal steps of the method will now be described.

[050] A reel 1 carries a flexible and fragile material, made from a tight film such as aluminium or a barrier made from a plastic laminate. An adhesive or varnished coating or plastic sealing layer such as polyethylene is applied onto this flexible material. This reel is placed on an unwinding system 2. This material will form the sleeve. The forming of the sleeve is achieved by a forming device 3 surrounding a mandrel 4. The sleeve thus formed is driven by two shoes with belts (not represented on this figure). These shoes are pulled by a powered drive and are placed on both sides of the mandrel immediately after the forming system. The forming device 3 achieves the forming of the flexible material onto itself so as to place together the sealing face to enable a seal, so that a tight sleeve is obtained. Sealing is accomplished on the outlet side of the forming device by a sealing device 5 utilizing heat conduction or ultrasound or high frequency or similar. The so formed and tight sleeve is pulled uninterrupted by the shoes with belts on mandrel 4.

[051] Following the sealing device, a stock of cardboard sheets 6 is located. These sheets include a precut weakness. In the case represented on the figure, each sheet 6 consists of cardboard pieces having a length

corresponding to two cans. However, the number of cans that can be formed with a sheet depends of course on the size of the can and on the choice made at the beginning. Thus, according to the size, one or more cans can be formed from each sheet. The magazine or case containing the sheets 6 is placed opposite the sheet forming system and a removal system such as vacuum cups takes the sheets from the store and moves them towards a gluing system made up of two cylinders 7 and 8. The cylinder 7 deposits an adhesive on the face of each sheet 6 that is intended to come into contact with the sleeve. While leaving the gluing system 7 and 8, the sheet is gripped by the hollow cylinder 9 provided with two longitudinal rows of radial holes 10 (only one series of holes can be seen on the figures). Each series of holes communicates with a vacuum chamber situated inside the cylinder. The vacuum chambers are controlled by an individual system of valves. When the end of sheet 6 reaches the first series of holes 10, the vacuum is activated in the corresponding chamber. Thus the end of the sheet is sucked against cylinder 9 by the vacuum. Thereafter, cylinder 9 turns around its axis and when the other end of the sheet reaches the second series of holes, the vacuum is also activated and in this manner the sheet remains securely wrapped around and against the cylinder 9 by the vacuum. It is obvious that the distance between the two series of holes is at least approximately equal to the width of the sheet used. From this moment, the cylinder 9 carries the sheet with the adhesive on the outside. Cylinder 9 moves initially towards the sleeve that is already on the mandrel and then rolls against this sleeve to apply the sheet to it. When the cylinder 9 comes into contact with the sleeve along one of the ends of the sheet, the vacuum in the corresponding chamber is released. Thus, the end of the sheet can remain in contact with the sleeve. When the cylinder has rolled around the sleeve, the second end of the sheet comes in contact with the first edge. This edge overlaps the edge already adhered against the sleeve and the second vacuum chamber is released, leaving the second end glued on the first.

[052] The operation of the cylinder 9 will be described in more detail using figures 3 to 5.

[053] Shoes 11 (like those on the outlet side of the forming device and not represented) move then the tube along the mandrel. The function of these shoes is to advance the tube thus obtained towards a device for cutting or knife slicing 13. When the tube arrives in front of the device, it is supported by the cylinder 12 and the knives move against the sleeve and turn around the tube. This cuts up the sheet made out of the rolled up cardboard and also cuts the sleeve that is stuck on the cardboard. When the knives made a full rotation, the cylinder 12 and knife 13 move away and the carriage returns to its original place ready for the next operation. Thus, tubes 14, which are the principal body of the can are obtained at the exit.

[054] On figure 2, an alternative shape is represented for the tube, obtained by a similar device. It involves an approximately rectangular can. If such a can is desired, mandrel 4 will have a corresponding form. By means of the device described, any desired shape can practically be obtained. It is only required to have a mandrel having this form.

[055] It should be noted that during the gluing step of sheet 6 onto the sleeve, it is ensured that the covering of the two pasted ends of the sleeve and the two ends of the cardboard are in opposition. This to cancel the stresses of deformation and also to avoid the formation of superimposed pads.

[056] The various steps previously described can be carried out step by step. It is then proceeded in the following way.

[057] After the formation of the sleeve, when it arrives at the gluing system for the cardboard sheets, the installation stops until the cardboard is pasted.

[058] It is then passed to the knives, stoped and so on.

[059] Another possibility consists in doing all the steps in a continuous way. In this case, the stock of sheets 6, the gluing system 7, 8, the vacuum cylinder 9 and the slicing device 12, 13 are assembled on carriages which follow the

movement of the sleeve. Work can then be carried out in synchronization. These carriages thus carry out work in a backwards and forwards motion between two predetermined positions.

[060] Figures 3, 4 and 5 will now be used to describe the device for wrapping the piece of cardboard onto the sleeve.

[061] On figure 3, a profile view of the device is shown that is made up in theory of two concentric plates 15 with mandrel 4. These plates support the ends of the hollow cylinder 9. The hollow cylinder 9 is situated between two bearings 16, at each side. Bearings 16 are supported by two cylinders 17 assembled on a support 18, support 18 being secured to the plate 15.

[062] On figure 3, the starting position is shown. The cylinder 7 is seen in contact with a cylinder 7'. This cylinder 7' is coated on its surface with the adhesive in container 7". Sheet 6 with its lower face coated with glue comes towards the vacuum cylinder 9. When the end of the sheet reaches the first line of holes 10, the corresponding vacuum chamber (not represented) is activated and the end of the sheet is sucked against the cylinder by the vacuum. Thereafter, cylinder 9 turns in the direction of the arrow and it takes the sheet 6 with it. This sheet is maintained against the cylinder by its end being sucked against the cylinder by the vacuum through holes 10. When the second end of the sheet reaches the other series of holes 10 (see figure 4), the corresponding vacuum chamber is also activated. Thus sheet 6 is sucked against cylinder 9. At this time, two cylinders 17 are activated and cylinder 9 comes to rest against mandrel 4 bearing the sleeve. As soon as the contact between cylinder 6 and the mandrel 4 is obtained, the vacuum in the corresponding line of holes 10 is deactivated. This makes it possible to obtain the joining of the end of the sheet against the sleeve. As shown thereafter on figure 5, plates 15 turn through 360° around mandrel 4 in the direction of the arrow. The rolling of cylinder 9 against mandrel 4 is thus obtained, which makes it possible to glue the sheet of cardboard against the sleeve. Cylinder 9 always rolls in the direction of the arrow indicated on the drawings. When the

second end of the sheet arrives on and covers the first end, the second series of holes is deactivated. This makes it possible to glue the end of the sheet onto the first end. Thus the operation of joining and gluing the cardboard onto the sleeve is carried out. Then, cylinders 17 move away cylinder 9 and the method can start again with the following sheet.

[063] As mentioned previously, these operations can be achieved in synchronism with the advancing of the sleeve. The device is assembled on a carriage that moves parallel to and at the speed of the sleeve. These operations can be done step by step. In this case, the installation device of the cardboard onto the sleeve is not moved in the transverse direction. The knives are then placed opposite to the vacuum cylinder.

[064] If the mandrel has a different form, such as for example that of figure 2, cylinder 9 will follow the contour of the mandrel. Cylinders 17 make it possible to adapt to the profile.

[065] Figure 6 representative of a section through a can will now be refered to. The body of the can 20 obtained by this way consists of the interior sleeve 21 and the external cardboard 22. It is placed on a rotating table for the installation of the upper closure 23, and for the optional installation of an interior flange 24. Flange 24 is produced and shaped earlier and separately from a flexible cardboard and is coated with a sealing product in a form that matches exactly the interior dimensions and shape of the can 20. This flange 24 is introduced into the lower part. The flange 24, made out of cardboard, is glued or sealed at its base 25 by a punch heated near a precut weakness 26. It is around this precut weakness 26 that the can opening will be achieved later. The flange is thus assembled positioned approximately with half above the line of the precut weakness and the other below the line of the precut weakness. Its position and its profile make it possible to ensure the secure location and positioning of the lid after the can has been opened, so long as the packed products are not consumed.

[066] For the higher closure, a disc 32 in a similar or identical cardboard to that used for the body of the can is coated with a protective or plastic film 27 with a sealing product and cut out in the correct form. It is simultaneously pressed with the internal shape of the can and is placed inside. A tool equipped with a system of sealing by heat conduction or ultrasound or high frequency places the closure 23 into position and seals it into position ensuring an hermetic seal. Its wall is sealed against that of the can body and in particular that of sleeve 21. The forming of the end of the can body is proceeded thereafter. This forming consists of folding in the end of the body 22 towards the interior, and pressing firmly to ensure a good closure and protection of the closure 23. Thereafter, the can is sent to the filling station. When the control of packed weight or other control checks on the content have been carried out, one positions the lower closure 28 also made up of a disc 29 out of cardboard provided with a protective film 30 similar or identical to film 27 is positioned. Thereafter and by the same means as that previously described, this disc is sealed to form the lower part of the case. Before sealing, a light vacuum can be created inside the can to compress the volume generated by the bottom.

[067] Cans thus obtained are represented on figure 7 in various steps of opening. The can includes the body 22 with the precut weakness 19 or 26. It carries an indication 31 indicating where it is desirable that the consumer presses with and inserts, for example, his thumb. This insertion makes it possible to obtain a tear of the precut and at the same time also a tear of the interior sleeve as represented on the second figure. The indication of the place for the insertion is arbitrary. However and preferably, this should not exist at the places where the longitudinal joints of the sleeve and of the external tube are.

[068] When this initiation of an opening has been obtained, it is enough to apply a pull on the higher part of can to obtain the complete tear achieved by the precut, of the cardboard and of the interior sleeve, this sleeve being glued

directly onto the cardboard body. The can opening and the ability to see the displayed product inside are thus obtained. The flange 24 allows the lid to be positioned back when the can is not completely empty. An almost tight closing is thus obtained.